Small Business Innovation Research/Small Business Tech Transfer

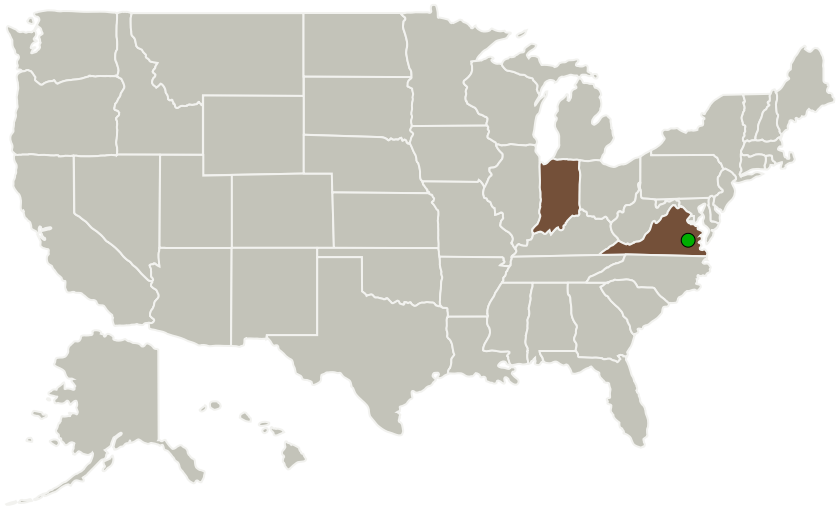
Electromagnetic Characterization of Advanced Composites by Voxel-Based Inverse Methods, Phase I

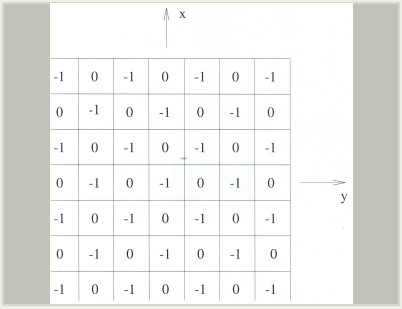
Completed Technology Project (2017 - 2017)

Project Introduction

The nondestructive characterization of advanced composites, such as carbon-fiber reinforced polymers (cfrp), by electromagnetic means is well established. What is needed to advance the state of the art are sophisticated inversion algorithms that allow layup and impact damage to be determined in localized regions, which means that more traditional methods of model-based inverse methods must be replaced by voxel-based inverse methods. Thus, one will be able to better distinguish such things as delaminations from fiber-breakage due to impact damage, or other parameters that characterize the mechanical of the cfrp structure, such as elastic modulus and Poisson's ratio on a voxel-by-voxel basis. This information can then be input to damage evolution models. We describe two such methods, bilinear conjugate-gradients and set-theoretic estimation. The challenge is to extend these methods to anisotropic materials. We do that in this project, and will develop the algorithms for inclusion in our proprietary eddy-current, VIC-3D(R) during Phase II. In addition, we continue our program of discovering and exploiting parallelism in VIC-3D(R) to speed up the modeling and processing that involve massive data generation.

Primary U.S. Work Locations and Key Partners





Electromagnetic Characterization of Advanced Composites by Voxel-Based Inverse Methods, Phase I Briefing Chart Image

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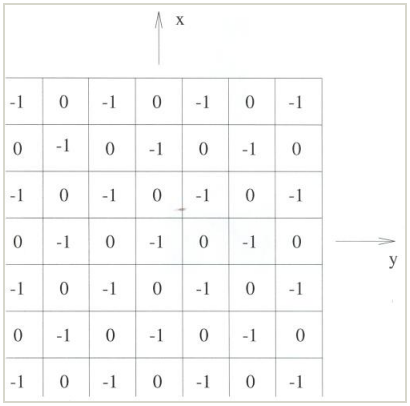
Completed Technology Project (2017 - 2017)

Organizations Performing Work	Role	Type	Location
Victor Technologies, LLC	Lead Organization	Industry Veteran-Owned Small Business (VOSB)	Bloomington, Indiana
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Indiana	Virginia

Images



Briefing Chart Image
Electromagnetic Characterization of Advanced Composites by Voxel-Based Inverse Methods, Phase I Briefing Chart Image *(https://techport.nasa.gov/image/135258)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Victor Technologies, LLC

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

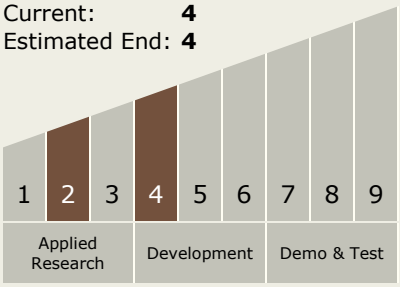
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Harold Sabbagh

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX13 Ground, Test, and Surface Systems
  - TX13.1 Infrastructure Optimization
    - TX13.1.7 Impact/Damage/Radiation Resistant Systems